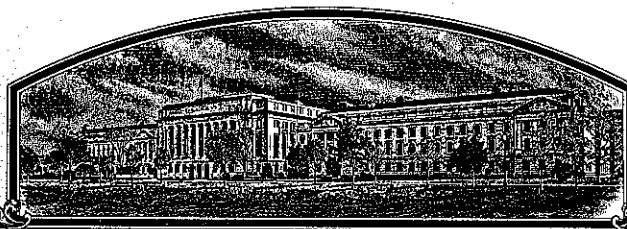


No.

9700083



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

NASH Research Foundation

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED, PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSES, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. IN THE UNITED STATES SEED OF THIS VARIETY (1) SHALL BE IDENTIFIED BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF SEEDS SPECIFIED BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

DURUM WHEAT

'Ben'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this twenty-ninth day of August in the year of our Lord one thousand nine hundred and ninety-seven.

Attest:

Martha A. Huns

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Sam Phillips
Secretary of Agriculture

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY DIVISION - PLANT VARIETY PROTECTION OFFICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) (as it is to appear on the Certificate)		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER	3. VARIETY NAME
NDSU Research Foundation		D87130	'Ben'
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)		5. TELEPHONE (include area code)	FOR OFFICIAL USE ONLY PVPO NUMBER 9700083
c/o Executive Director PO Box 5014 Fargo, ND 58105-5014		701-231-8931	
		6. FAX (include area code)	FILING DATE Jan. 17, 1997
		701-231-1013	
7. GENUS AND SPECIES NAME	8. FAMILY NAME (Botanical)		FILING AND EXAMINATION FEE:
Triticum turgidum L.	Framineae		\$ 2450.00
9. CROP KIND NAME (Common name)			DATE Jan. 17, 1997
Durum Wheat			CERTIFICATION FEE:
10. IF THE APPLICANT NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION (corporation, partnership, association, etc.) (Common name)			\$ 300.00
501 (c) (3) Corporation - NDSU Research Foundation			DATE July 27, 1997
11. IF INCORPORATED, GIVE STATE OF INCORPORATION		12. DATE OF INCORPORATION	
North Dakota		May 1989	
13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS			14. TELEPHONE (include area code)
Elias M. Elias Department of Plant Sciences North Dakota State University PO Box 5051 Fargo, ND 58105-5051			701-231-8159
Dale Zetocha Executive Director NDSU Research Foundation PO Box 5014 Fargo, ND 58105-5014			15. FAX (include area code)
			701-231-8474
16. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse)			
a. <input checked="" type="checkbox"/> Exhibit A. Origin and Breeding History of the Variety b. <input checked="" type="checkbox"/> Exhibit B. Statement of Distinctness c. <input checked="" type="checkbox"/> Exhibit C. Objective Description of the Variety d. <input checked="" type="checkbox"/> Exhibit D. Additional Description of the Variety (Optional) e. <input checked="" type="checkbox"/> Exhibit E. Statement of the Basis of the Applicant's Ownership f. <input checked="" type="checkbox"/> Voucher Sample (2,500 viable untreated seeds or, for tuber propagated varieties verification that tissue culture will be deposited and maintained in an approved public repository) g. <input checked="" type="checkbox"/> Filing and Examination Fee (\$2,450), made payable to "Treasurer of the United States" (Mail to PVPO)			
17. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY, AS A CLASS OF CERTIFIED SEED? (See Section 83(a) of the Plant Variety Protection Act)			
<input checked="" type="checkbox"/> YES (If "yes," answer items 18 and 19 below) <input type="checkbox"/> NO (If "no," go to item 20)			
18. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?		19. IF "YES" TO ITEM 18, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		<input checked="" type="checkbox"/> FOUNDATION <input checked="" type="checkbox"/> REGISTERED <input checked="" type="checkbox"/> CERTIFIED	
20. HAS THE VARIETY OR A HYBRID PRODUCED FROM THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETING IN THE U.S. OR OTHER COUNTRIES?			
<input checked="" type="checkbox"/> YES (If "yes," give names of countries and dates) <input type="checkbox"/> NO			
USA - Release date - March 27, 1996			
21. The applicant(s) declare that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.			
The undersigned applicant(s) is(are) the owner(s) of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.			
Applicant(s) is(are) informed that false representation herein can jeopardize protection and result in penalties.			
SIGNATURE OF APPLICANT (Owner(s))		SIGNATURE OF APPLICANT (Owner(s))	
Dale Zetocha			
NAME (Please print or type)		NAME (Please print or type)	
Dale Zetocha			
CAPACITY OR TITLE	DATE	CAPACITY OR TITLE	DATE
Executive Director NDSU Research Foundation	1/16/97		

EXHIBIT A - ORIGIN AND BREEDING HISTORY

'BEN'

Fall 1983	Original cross made at North Dakota State University (NDSU) greenhouse. Pedigree - D8024/Monroe D8024 - D76119/Vic D76119 - D68111/Rugby//Ward D68111 - D65150/lds D65150 - pi/TM//2*TC/3/ZB/Wells
Spring 1984	F ₁ plants, NDSU greenhouse.
Summer 1984	F ₂ plants, NDSU research land.
Summer 1985	F ₃ head rows, NDSU research land.
Summer 1986	F ₄ head rows, NDSU research land.
Summer 1987	F ₅ head rows, NDSU research land.
Summer 1988	F ₆ preliminary yield trial, two locations, NDSU research land. Experimental line designation - D87130.
Summer 1989	F ₇ Advanced yield trial, two locations, NDSU research land.
Summer 1990	F ₈ Elite yield trial, three locations, NDSU research land.
Summer 1991	F ₉ Uniform Regional Durum Nursery, 15 locations, North Dakota, South Dakota, Minnesota, Montana, and Canada.
Summer 1992	F ₁₀ Uniform Regional Durum Nursery, 15 locations, North Dakota, South Dakota, Minnesota, Montana, and Canada.
Summer 1993	F ₁₁ Uniform Regional Durum Nursery, 15 locations, North Dakota, South Dakota, Minnesota, Montana, and Canada.

Summer 1994	Uniform Regional Durum Nursery, 15 locations, North Dakota, South Dakota, Minnesota, Montana, and Canada.
Summer 1995	Uniform Regional Durum Nursery, 15 locations, North Dakota, South Dakota, Minnesota, Montana, and Canada.
Summer 1995	Seed increase by Seedstocks Project.
March 17, 1996	D87130 was released as a named cultivar, Ben.
Summer 1996	Second seed increase by Seedstocks Project.

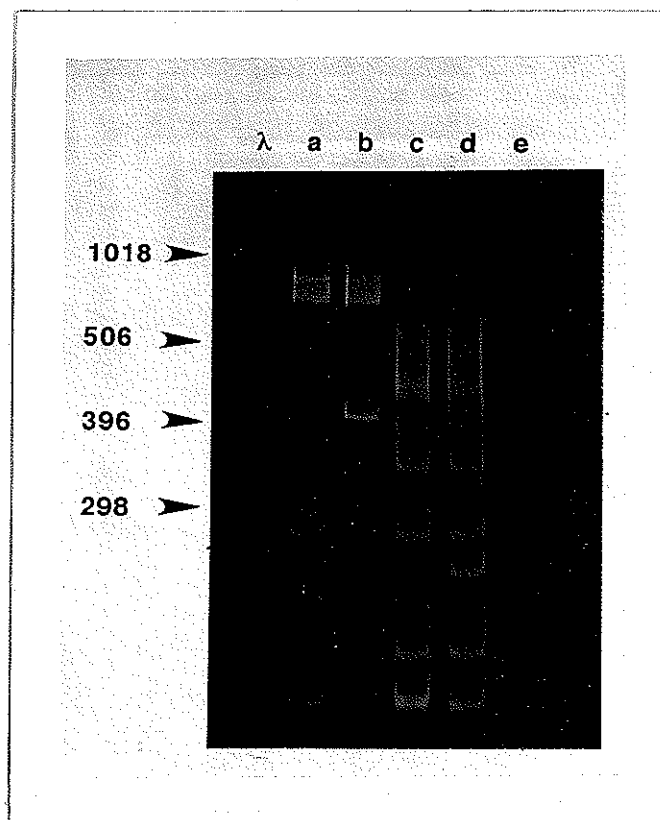
Ben was observed for ten generations from 1987 to 1996 and was shown to be stable and uniform. Ben has been rogued at the F_5 and subsequent generations. The frequency of rogued plants in each generation was less than 1/1000 plants. No variants were found in the variety Ben.

The pedigree breeding method was used to develop Ben. In early generations F_2 - F_4 high heritable traits such as plant height, maturity, and disease resistance were selected. Starting at F_5 generation, selection criteria also included grain yield, test weight, kernel weight, and pasta quality traits (i.e., protein content, gluten strength, milling extraction, spaghetti color, cooking quality, etc.). Based on data from multiple locations and years Ben was selected for its high yield and test weight, large kernel size, and moderate resistance to tan spot *Pyrenophora tritici-repentis*.

EXHIBIT B - NOVELTY STATEMENT

To my knowledge, Ben most nearly resembles Munich durum wheat. DNA analysis using STS-PCR products (Talbert et al., 1994) can easily differentiate Ben from Munich. Polymerase Chain Reaction (PCR) products of primer sets ABC 454 when separated on a 7% polyacrylamide gel, an approximately 410 base pairs DNA fragment can be found in Munich that is not present in Ben.

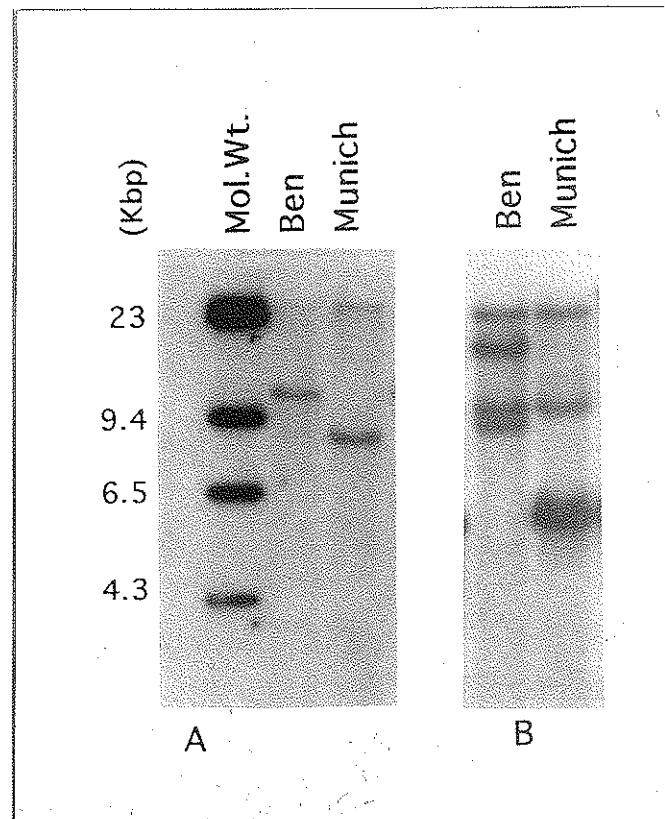
Figure 1. PCR product ABC 454 separated on a 7% polyacrylamide gel shows the critical 410 bp band. Lanes a and b represent uncut samples of Ben and Munich, respectively. Lanes c and d represent *Hinf I* restriction digested samples of Ben and Munich, respectively. Lane λ is molecular weight marker and lane e is negative control without genomic DNA.

Materials and Methods

DNA was extracted from a bulk of 12 seedling leaf stage plants from each of Munich and Ben using the protocol described in Anderson et al., (1993). Primer sets ABC 454 was obtained from Dr. Thomas Blake at Montana State University. The PCR amplification, restriction digest and polyacrylamide gel analysis was performed as described by Talbert et al., (1994) with the exception of an amplification profile of 30 cycles at 94 °C for 1 min., 50 °C for 1 min., and 72 °C for 1.2 min.

This is an attachment to exhibit B, showing that Ben and Munich durum wheat can be unambiguously differentiated by molecular markers. Restriction Fragment Length Polymorphism (RFLP) analysis using clones BCD292 and Fba204 shows polymorphism between Ben and Munich.

Figure 2. RFLP analysis of EcoR I - digested genomic DNA showing restriction fragment size polymorphism between Ben and Munich. **Panel A** Autoradiogram of Ben and Munich DNA hybridized with clone BCD 292. Polymorphism is shown by the presence of a 10.6 kilobasepairs DNA fragment present in Ben and 8.2 Kilobasepairs DNA fragments in Munich. **Panel B** Auotoradigram of clone Fba 204 which shows 12.6 and a 7.7 Kilobasepairs DNA fragment present in Ben and 5.5 Kilobasepairs DNA fragment in Munich.



Materials and Methods

Genomic DNA extraction, restriction endonuclease digestion, and Southern blotting were described in Anderson et al (1993). RFLP clones were obtained from Mark Sorrells at Cornell University (BCD clone) and Philippe Leroy at Institute National de la Recherche Agronomique (Fba clone). Both clones were known to hybridize to low-copy DNA sequences. The procedure was repeated twice to confirm results.

References

Anderson, J.A., M.E. Sorrells, and S.D. Tanksly. 1993. RFLP analysis of genomic regions associated with resistance to pre-harvest sprouting in wheat. Crop Sci. 33:453-459.

Talbert, L.E., N.K. Blake, P.W. Chee, T.K. Blake, and G.M. Magyar. 1994. Evaluation of "Sequence-Tagged-Site" PCR products as molecular markers in wheat. Theor. Appl. Genet. 78:495-504.

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
COMMODITIES SCIENTIFIC SUPPORT DIVISION
BELTSVILLE, MARYLAND 20706

EXHIBIT C
(Wheat)

OBJECTIVE DESCRIPTION OF VARIETY
WHEAT (TRITICUM SPP.)

INSTRUCTIONS: See Reverse.

NAME OF APPLICANT(S)

NORTH DAKOTA STATE UNIVERSITY RESEARCH FOUNDATION

ADDRESS (Street and No. or R.F.D. No., City, State, and ZIP Code)

Box 5014

Fargo, ND 58105-50514

FOR OFFICIAL USE ONLY

PVPO NUMBER

9700083

VARIETY NAME OR TEMPORARY DESIGNATION

Place the appropriate number that describes the varietal character of this variety in the boxes below.
Place a zero in first box (e.g., or) when number is either 99 or less or 9 or less.

1. KIND:

1 = COMMON 2 = DURUM 3 = EMMER 4 = SPELT 5 = POLISH 6 = POULARD 7 = CLUB

2. TYPE:

1 = SPRING 2 = WINTER 3 = OTHER (Specify) 1 = SOFT 2 = HARD 3 = OTHER (Specify)

1 = WHITE 2 = RED 3 = OTHER (Specify) Amber

3. SEASON - NUMBER OF DAYS FROM EMERGENCE TO:

FIRST FLOWERING LAST FLOWERING

4. MATURITY (50% Flowering):

NO. OF DAYS EARLIER THAN 1 = ARTHUR 2 = SCOUT 3 = CHRIS

NO. OF DAYS LATER THAN 4 = LEMHI 5 = NUGAINES 6 = LEEDS

5. PLANT HEIGHT (From soil level to top of head):

CM. HIGH

CM. TALLER THAN

CM. SHORTER THAN 1 = ARTHUR 2 = SCOUT 3 = CHRIS

4 = LEMHI 5 = NUGAINES 6 = LEEDS

6. PLANT COLOR AT BOOTING (See reverse):

1 = YELLOW GREEN 2 = GREEN 3 = BLUE GREEN

7. ANTHUR COLOR:

1 = YELLOW 2 = PURPLE

8. STEM:

Anthocyanin: 1 = ABSENT 2 = PRESENT

Hairiness of last internode of rachis: 1 = ABSENT 2 = PRESENT

NO. OF NODES (Originating from node above ground)

Waxy bloom: 1 = ABSENT 2 = PRESENT

Internodes: 1 = HOLLOW 2 = SOLID

CM. INTERNODE LENGTH BETWEEN FLAG LEAF AND LEAF BELOW

9. AURICLES:

Anthocyanin: 1 = ABSENT 2 = PRESENT

Hairiness: 1 = ABSENT 2 = PRESENT

10. LEAF:

Flag leaf at booting stage: 1 = ERECT 2 = RECURVED 3 = OTHER (Specify):

Hairs of first leaf sheath: 1 = ABSENT 2 = PRESENT

MM. LEAF WIDTH (First leaf below flag leaf)

Flag leaf: 1 = NOT TWISTED 2 = TWISTED

Waxy bloom of flag leaf sheath: 1 = ABSENT 2 = PRESENT

CM. LEAF LENGTH (First leaf below flag leaf)

EXHIBIT D - ADDITIONAL DESCRIPTION OF VARIETY

On the average 1000 kernel weight of Ben is 5.8 mg higher than Munich (Table 1). The data for kernel weight is normally distributed for all three year. Data across years is not presented because years were not homogenous. Tables 2 and 3 provide additional agronomic and quality data for information purposes only.

Table 1. Kernel Weight Mean of Ben and Munich at Dickinson, North Dakota.

Genotype	1993	1994	1996
	----- mg -----		
Ben	39.0	44.6	39.2
Munich	31.2	39.5	34.6
LSD (0.05)	3.0	3.1	3.7

Table 2. Mean of agronomic traits and diseases of Ben and selected cultivars grown at various locations in North Dakota, Canada, Montana, South Dakota, and Minnesota (1991 through 1995).

Genotype	Yield	Test Weight	Kernel Weight	Heading	Height	Leaf dis.	Lodging
	bu/A	lb/bu	mg	days	cm	(0-9)	(0-9)
BEN	51.3	60.0	42.4	63.0	92.8	3.8	1.6
MUNICH	48.8	58.2	38.1	62.9	90.0	4.8	2.8
MONROE	45.4	58.4	41.9	60.0	92.4	4.6	2.3
VIC	47.0	59.1	40.8	62.3	98.0	4.5	2.6
RENVILLE	50.5	58.9	37.5	63.4	97.5	4.6	2.5
RUGBY	49.1	59.7	39.0	62.5	98.4	4.1	2.5
LLOYD	44.9	55.0	38.2	64.4	72.9	5.5	1.3

Table 3. Summary of quality evaluations for Ben grown at 32 location/years in field plots (1991 through 1995).

Genotype	% Protein		Mixograph	Sedimentation	% Extraction		Kernel Size	
	Wheat	Semolina			Total	Semolina	% Large	% Small
				mm				
Ben	14.5	13.7	6.4	44	69.3	60.2	54	2
Munich	14.4	13.8	5.3	40	69.7	60.2	38	4
Monroe	14.3	13.6	6.2	42	69.4	60.2	50	2
Vic	14.5	13.8	5.8	41	69.4	59.8	47	2
Renville	14.5	13.7	5.8	41	69.9	60.6	28	5
Rugby	14.5	13.7	3.0	24	69.4	60.3	38	3
Lloyd	14.3	13.4	6.2	45	68.3	59.0	32	6

EXHIBIT E - STATEMENT OF THE BASIS OF THE APPLICANT'S OWNERSHIP

Dr. Elias M. Elias, an employee of the North Dakota Agricultural Experiment Station and North Dakota State University, is a plant breeder who developed 'Ben' the durum wheat cultivar for which Plant Variety Protection is hereby sought. The employee by agreement and because of the condition of the use of facilities and funds of the North Dakota Agricultural Experiment Station and North Dakota State University has assigned all ownership rights to 'Ben' durum wheat to the North Dakota Agricultural Experiment Station and North Dakota State University.

North Dakota State University on behalf of the North Dakota Agricultural Experiment Station has assigned all ownership to the NDSU Research Foundation. The NDSU Research Foundation is a nonprofit corporation set up to own and manage the intellectual property of North Dakota State University.

EXHIBIT E
STATEMENT OF THE BASIS OF OWNERSHIP

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) NDSU Research Foundation		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER D87130	3. VARIETY NAME 'BEN'
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country) c/o Executive Director PO BOX 5014 FARGO, ND 58105-5014		5. TELEPHONE (include area code) 701-231-8931	6. FAX (include area code) 701-231-1013
8. Does the applicant own all rights to the variety? Mark an "X" in appropriate block. If no, please explain.		7. PVPO NUMBER 9700083	
		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
9. Is the applicant (individual or company) a U.S. national or U.S. based company? If no, give name of country			
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			
10. Is the applicant the original owner? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO If no, please answer the following:			
a. If original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. national(s)?			
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO If no, give name of country			
b. If original rights to variety were owned by a company, is the original owner(s) a U.S. based company?			
<input type="checkbox"/> YES <input type="checkbox"/> NO If no, give name of country			
11. Additional explanation on ownership (If needed, use reverse for extra space):			

See additional Exhibit E Statement of the Basis of the Applicant's Ownership included in this application.

PLEASE NOTE:

Plant variety protection can be afforded only to owners (not licensees) who meet one of the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.
2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.
3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definition.

According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0055. The time required to complete this information collection is estimated to average 10 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in its programs on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, and marital or familial status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (braille, large print, audiotape, etc.) should contact the USDA Office of Communications at (202) 720-5881 (voice) or (202) 720-7808 (TDD). To file a complaint, write the Secretary of Agriculture, U.S. Department of Agriculture, Washington, D.C. 20250, or call 1-800-245-6340 (voice) or (202) 720-1127 (TDD). USDA is an equal employment opportunity employer.